Shanmuga Industries Arts & Science College T.V.Malai

APRIL/MAY 2025

FASC42/CASC42/BASC42 — QUANTITATIVE TECHNIQUES – II (ALLIED)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. An activity has an optimistic time of 15 days, a most likely time of 1 8 days, and a pessimistic time of 27 days. What is its expected time?
2. Enumerate the parameters used for determining the Critical Path.
3. Write any two assumptions of EOQ Model.
4. Define Inventory.
5. Define Idle Time on a machine in a Sequencing Problem.
6. What is Problem of Sequencing?
7. Define Mixed Strategy.
8. State the assumptions for Two-Person Zero Sum Game..

9. Distinguish between Individual and Group Replacement Polices.

10. What is Replacement Problem?

SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions.

11. (a) Compare PERT and CPM.

Or

(b) What is meant by the slack of an activity? How will you determine it?

12. (a) A manufacturer uses Rs. 10,000 worth of an item during the year. He has estimated the ordering costs as Rs. 25 per order and carrying costs as 12.5% of average inventory value. Find the optimal order size, number of order per year, time period per order and total cost.

Or

(b) An oil engine manufacturer purchases lubricants at the rate of Rs. 42 per piece from a vendor. The requirement of these lubricants is 1,800 per year. What should be the order quantity per order, if the cost per placement of an order is Rs.16 and inventory carrying charge per rupee per year is 20 paise?

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20. Following mortality rates have been observed for a certain type of electronic component.

Month	0	1	2	3	4	5	6
% surviving at the end of the month	100	97	90	70	30	15	0

There are 10000 items in operation. It costs Re 1 to replace an individual item and 35 paise per item, if all items are replaced simultaneously. It is decided to replace all items at fixed intervals & to continue replacing individual items as and when they fail. At what intervals should all items be replaced? Assume that the items failing during a month are replaced at the end of the month.

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18. Find the total elapsed time and optimal sequence for the following sequencing problem of four jobs and five machines when passing is not allowed, of which processing time (in hours) is given below:

	Machine				
Job	A	B	C	D	E
1	7	5	2	3	9
2	6	6	4	5	10
3	5	4	5	6	8
4	8	3	3	2	6

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19. For the game with the following pay-off matrix, determine the saddle point.

		Player B Strategies			
		I	II	III	IV
Player A Strategies	1	2	–1	0	–3
	2	1	0	3	2
	3	–3	1	–1	4

13. (a) There are five jobs (namely 1,2,3,4 and 5), each of which must go through machines A, B and C in the order ABC. Processing Time (in hours) is given below:

Jobs	1	2	3	4	5
Machine A	5	7	6	9	5
Machine B	2	1	4	5	3
Machine C	3	7	5	6	7

Find the sequence that the minimum total elapsed time required to complete the jobs.

Or

(b) Explain the procedure involved in solving processing of n jobs through two machines problem.

14. (a) Examine whether the following 2 × 2 game has a saddle point.

		Player B Strategies	
		I	II
Player A	1	3	5
Strategies	2	4	2

Or

(b) Solve the following game by Graphical Method.

	Player B Strategies	
Player A Strategies	−18	2
	6	−4

15. (a) The cost of a machine is Rs. 6100 and its scrap value is only Rs.100. The maintenance costs are found to be

Year	1	2	3	4	5	6	7	8
Maintenance Cost (inRs.)	100	250	400	600	900	1250	1600	2000

When should the machine be replaced?

Or

(b) Following mortality rates have been observed for certain type of light bulbs.

Time (weeks)	0	1	2	3	4	5	6	7	8	9	10
Number of bulbs still operating	100	94	82	58	40	28	19	13	7	3	0

Calculate the probability of failure.

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Draw a network diagram of the following schedule of activities and find its critical path. Also calculate slack time for each event

Activity	1–2	1–3	1–4	2–6	3–7	3–5	4–5	5–9
Duration (in days)	2	2	1	4	5	8	3	5
Activity	6–8	7–8	8–9					
Duration (in days)	1	4	3					

17. (a) A product is to be manufactured on a machine. The cost, production, demand, etc are as follows: Ordering cost per order = Rs.30, Purchase cost per unit = Rs.0.10, Inventory holding cost per unit per annum = Rs.0.05, Production rate = 1,00,000 units per year, Demand rate 10,000 units / year. Determine the economic manufacturing quantity. (5)

(b) Using the following information, obtain the EOQ and the total variable cost associated with the policy of ordering quantities of that size. Annual demand = 20,000 units, ordering cost = Rs. 150 per order, and inventory carrying cost is 24% of average inventory value. (5)